AMENDMENTS TO THE CLAIMS

Claim 1 (original): A sound source apparatus having a voice synthesis capability, comprising a plurality of tone forming parts for outputting either of desired tones or formants according to designation of a wave table sound source mode or a voice synthesizing mode, such that the tone forming parts generate the tones in the wave table sound source mode, and generate the formants for synthesis of a voice in the voice synthesizing mode, wherein each of the tone forming parts comprises:

a waveform shape specifying section that specifies a desired waveform shape from among a plurality of waveform shapes;

a waveform data storage section that stores waveform data corresponding to the plurality of the waveform shapes;

a waveform data reading section that operates in the wave table sound source mode for generating a variable address changing at a rate corresponding to a musical interval of the tone to be generated, and reading the waveform data corresponding to the waveform shape specified by the waveform shape specifying section from the waveform data storage section by the variable address, and that operates in the voice synthesizing mode for generating a variable address changing at a rate corresponding to a center frequency of the formant to be generated, and reading the waveform data corresponding to the waveform shape specified by the waveform shape specifying section from the waveform data storage section by the variable address; and

an envelope application section that operates in the wave table sound source mode for generating an envelope signal which rises in synchronization with an instruction to start the generating of the tone and decays in synchronization with another instruction to stop the generating of the tone, and applying the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section, and that operates in the voice synthesizing mode for generating an envelop signal which rapidly decays every timing corresponding to a pitch period of the voice to be synthesized and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 2 (original): A sound source apparatus having a voice synthesis capability, comprising a plurality of tone forming parts for outputting either of desired tones or formants according to designation of a wave table sound source mode or a voice synthesizing mode, such that the tone forming parts generate the tones in the wave table sound source mode, and generate the formants for synthesis of a voice in the voice synthesizing mode, wherein each of the tone forming parts comprises:

a waveform shape specifying section that specifies a desired waveform shape from among a plurality of waveform shapes;

a waveform data storage section that stores waveform data corresponding to the plurality of the waveform shapes;

a waveform data reading section that operates in the wave table sound source mode for generating a variable address changing at a rate corresponding to a musical interval of the tone to be generated, and reading the waveform data corresponding to the waveform shape specified by the waveform shape specifying section from the waveform data storage section by the variable address, and that operates in the voice synthesizing mode for generating a variable address changing at a rate corresponding to a center frequency of the formant to be generated, and reading the waveform data corresponding to the waveform shape specified by the waveform shape specifying section from the waveform data storage section by the variable address;

an envelope application section that generates an envelope signal which rises in synchronization with an instruction to start the generating of the tone or the synthesis of the voice and decays in synchronization with another instruction to stop the generating of the tone or the synthesis of the voice, and that applies the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section; and

a noise adding section that operates in the voice synthesizing mode for adding a noise to the waveform data with the envelope signal applied by the envelope application section.

Claim 3 (original): A voice synthesizing apparatus comprising:

a plurality of formant forming parts, each of which forms a formant having a desired formant center frequency and a desired formant level; and

a synthesizing part that mixes a plurality of the formants formed by the plurality of the formant forming parts for generating a voice, wherein

each of the plurality of the formant forming parts comprises:

a waveform data storage section that stores waveform data corresponding to a predetermined waveform shape;

a waveform data reading section that generates an address changing at a rate corresponding to the formant center frequency so as to read the waveform data stored in the waveform data storage section by the generated address to thereby form the formant; and

a noise adding section that adds a noise to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 4 (original): The voice synthesizing apparatus according to claim 3, wherein the formant forming part further comprises an envelope application section that generates an envelope signal which rises in synchronization with an instruction to start the generating of the voice and decays in synchronization with another instruction to stop the generating of the voice, and that applies the envelope signal to either of the waveform data read by the waveform data reading section from the waveform data storage section or the waveform data with the noise added by the noise adding section.

Claim 5 (original): The voice synthesizing apparatus according to claim 3, wherein the formant forming part further comprises a multiplication section that multiplies the waveform data by level data corresponding to the formant level.

Claim 6 (original): The voice synthesizing apparatus according to claim 5, wherein the synthesizing part mixes the plurality of the formants, each of which has the desired formant center frequency and the desired formant level and is outputted from each of the plurality of the formant forming parts so as to generate the voice of an unvoiced sound.

Claim 7 (original): The voice synthesizing apparatus according to claim 3, wherein the waveform data storage section stores sine waveform data.

Claim 8 (original): The voice synthesizing apparatus according to claim 3, wherein the noise adding section comprises a noise generator for generating a white noise and a filter for limiting a spectrum band of the white noise.

Claim 9 (original): A voice synthesizing apparatus comprising:

a plurality of formant forming parts for forming formants having desired formant center frequencies in the form of either voiced sound formants or unvoiced sound formants according to designation of a voiced sound synthesizing mode or an unvoiced sound synthesizing mode; and

a synthesizing part that mixes a plurality of the voiced sound formants formed by the plurality of the formant forming parts to generate a voiced sound, and that mixes a plurality of the unvoiced sound formants formed by the plurality of the formant forming parts to generate an unvoiced sound, wherein

each of the plurality of the formant forming parts comprises:

a waveform data storage section that stores waveform data corresponding to a predetermined waveform shape;

a waveform data reading section that generates an address changing at a rate corresponding to the formant center frequency of the formant and reads the waveform data stored in the waveform data storage section in response to the generated address; and

an envelope application section that operates in the voiced sound synthesizing mode for generating an envelop signal which rapidly decays every timing corresponding to a pitch period of the voiced sound and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section, and that operates in the unvoiced sound synthesizing mode for generating an envelope signal which rises in synchronization with an instruction to start the generating of the unvoiced sound and decays in synchronization with an instruction to stop the generating of the unvoiced sound, and applying the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 10 (original): The voice synthesizing apparatus according to claim 9, wherein each of the formant forming parts further comprises a noise adding section that operates in the unvoiced sound synthesizing mode for adding a noise to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 11 (original): A voice synthesizing apparatus comprising:

a plurality of formant forming parts for forming formants having formant center frequencies in the form of either voiced sound formants or unvoiced sound formants according to designation of either a voiced sound synthesizing mode or an unvoiced sound synthesizing mode; and

a synthesizing part that mixes a plurality of the voiced sound formants formed by the plurality of the formant forming parts to generate a voiced sound, and that mixes a plurality of the unvoiced sound formants formed by the plurality of the formant forming parts to generate an unvoiced sound, wherein

each of the plurality of the formant forming parts comprises:

a waveform data storage section that stores waveform data corresponding to a plurality of waveform shapes;

a waveform shape specifying section that operates in the voiced sound synthesizing mode for specifying a desired waveform shape from among the plurality of the waveform shapes, and that operates in the unvoiced sound synthesizing mode for specifying a predetermined waveform shape;

a waveform data reading section that generates an address changing at a rate corresponding to the formant center frequency and reads from the waveform data storage section the waveform data corresponding to the waveform shape specified by the waveform shape specifying section in response to the generated address; and

an envelope application section that operates in the voiced sound synthesizing mode for generating an envelop signal which rapidly decays every timing corresponding to a pitch period of the voiced sound and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section, and that operates in the unvoiced sound synthesizing mode for generating an envelope signal which rises in synchronization with an instruction to start the generating of the unvoiced sound and decays in synchronization with an instruction to stop the generating of the unvoiced sound, and applying the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 12 (original): The voice synthesizing apparatus according to claim 11, wherein each of the formant forming parts further comprises a noise adding section that operates in the unvoiced sound synthesizing mode for adding a noise to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 13 (original): A voice synthesizing apparatus comprising:

a plurality of formant forming parts, each of which forms a formant having a desired formant center frequency; and

a synthesizing part that mixes a plurality of the formants formed by the plurality of formant forming parts to generate a voice, wherein

each of the plurality of the formant forming parts comprises:

a waveform shape specifying section that specifies a desired waveform shape from among a plurality of waveform shapes;

a waveform data storage section that stores waveform data corresponding to the plurality of the waveform shapes;

a waveform data reading section that generates an address changing at a rate corresponding to the formant center frequency and reads from the waveform data storage section the waveform data corresponding to the specified waveform shape in response to the generated address; and

an envelope application section that generates an envelope signal which rapidly decays every timing corresponding to a pitch period of the voice and rapidly rises after the decay, and that applies the generated envelope signal to the waveform data read by the waveform data reading section from the waveform data storage section.

Claim 14 (original): The voice synthesizing apparatus according to claim 13, wherein the synthesizing part mixes the plurality of the formants formed by the plurality of the formant forming parts to generate the voice in the form of a voiced sound.

Claim 15 (original): A method of controlling a sound source apparatus having a voice synthesis capability and comprising a plurality of tone forming parts for outputting either of desired tones or formants according to designation of a wave table sound source mode or a voice synthesizing mode, such that the tone forming parts generate the tones in the wave table sound source mode, and generate the formants for synthesis of a voice in the voice synthesizing mode, wherein the method controls each of the tone forming parts by the steps of:

specifying a desired waveform shape from among a plurality of waveform shapes;

storing waveform data corresponding to the plurality of the waveform shapes in a memory;

generating in the wave table sound source mode a variable address changing at a rate corresponding to a musical interval of the tone to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating in the voice synthesizing mode a variable address changing at a rate corresponding to a center frequency of the formant to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating in the wave table sound source mode an envelope signal which rises in synchronization with an instruction to start the generating of the tone and decays in synchronization with another instruction to stop the generating of the tone, and applying the generated envelope signal to the read waveform data; and

generating in the voice synthesizing mode an envelop signal which rapidly decays every timing corresponding to a pitch period of the voice to be synthesized and rapidly rises after the decay, and applying the generated envelope signal to the read waveform data.

Claim 16 (original): A method of controlling a sound source apparatus having a voice synthesis capability and comprising a plurality of tone forming parts for outputting either of desired tones or formants according to designation of a wave table sound source mode or a voice synthesizing mode, such that the tone forming parts generate the tones in the wave table sound source mode, and generate the formants for synthesis of a voice in the voice synthesizing mode, wherein the method controls each of the tone forming parts by the steps of:

specifying a desired waveform shape from among a plurality of waveform shapes;

storing waveform data corresponding to the plurality of the waveform shapes in a memory;

generating in the wave table sound source mode a variable address changing at a rate corresponding to a musical interval of the tone to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating in the voice synthesizing mode a variable address changing at a rate corresponding to a center frequency of the formant to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating an envelope signal which rises in synchronization with an instruction to start the generating of the tone or the synthesis of the voice and decays in synchronization with another instruction to stop the generating of the tone or the synthesis of the voice, and applying the generated envelope signal to the read waveform data; and

adding a noise in the voice synthesizing mode to the waveform data with the envelope signal applied.

Claim 17 (original): A method of controlling a voice synthesizing apparatus comprising a plurality of formant forming parts, each of which forms a formant having a desired formant center frequency, and a synthesizing part that mixes a plurality of the formants formed by the plurality of the formant forming parts for generating a voice, wherein the method controls each of the plurality of the formant forming parts by the steps of:

storing waveform data corresponding to a predetermined waveform shape in a memory;

generating an address changing at a rate corresponding to the formant center frequency so as to read the waveform data stored in the memory by the generated address to thereby form the formant; and

adding a noise to the waveform data read from the memory.

Claim 18 (original): A method of controlling a voice synthesizing apparatus comprising a plurality of formant forming parts for forming formants having desired formant center frequencies in the form of either voiced sound formants or unvoiced sound formants according to designation of a voiced sound synthesizing mode or an unvoiced sound synthesizing mode, and a synthesizing part that mixes a plurality of the voiced sound formants formed by the plurality of the formant forming parts to generate a voiced sound, and that mixes a plurality of the unvoiced sound formants formed by the plurality of the formant forming parts to generate an unvoiced sound, wherein the method controls each of the plurality of the formant forming parts by the steps of:

storing waveform data corresponding to a predetermined waveform shape in a memory;

generating an address changing at a rate corresponding to the formant center frequency of the formant and reading the waveform data from the memory in response to the generated address;

generating in the voiced sound synthesizing mode an envelop signal which rapidly decays every timing corresponding to a pitch period of the voiced sound and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read from the memory; and

generating in the unvoiced sound synthesizing mode an envelope signal which rises in synchronization with an instruction to start the generating of the unvoiced sound and decays in synchronization with an instruction to stop the generating of the unvoiced sound, and applying the generated envelope signal to the waveform data read from the memory.

Claim 19 (original): A method of controlling a voice synthesizing apparatus comprising a plurality of formant forming parts for forming formants having formant center frequencies in the form of either voiced sound formants or unvoiced sound formants according to designation of either a voiced sound synthesizing mode or an unvoiced sound synthesizing mode, and a synthesizing part that mixes a plurality of the voiced sound formants formed by the plurality of the formant forming parts to generate a voiced sound, and that mixes a plurality of the unvoiced sound formants formed by the plurality of the formant forming parts to generate an unvoiced sound, wherein the method controls each of the plurality of the formant forming parts by the steps of:

storing waveform data corresponding to a plurality of waveform shapes in a memory;

specifying a desired waveform shape from among the plurality of the waveform shapes in the voiced sound synthesizing mode;

specifying a predetermined waveform shape in the unvoiced sound synthesizing mode;

generating an address changing at a rate corresponding to the formant center frequency, and reading from the memory the waveform data corresponding to the specified waveform shape in response to the generated address;

generating in the voiced sound synthesizing mode an envelop signal which rapidly decays every timing corresponding to a pitch period of the voiced sound and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read from the memory; and

generating in the unvoiced sound synthesizing mode an envelope signal which rises in synchronization with an instruction to start the generating of the unvoiced sound and decays in synchronization with an instruction to stop the generating of the unvoiced sound, and applying the generated envelope signal to the waveform data read from the memory.

Claim 20 (original): A method of controlling a voice synthesizing apparatus comprising a plurality of formant forming parts, each of which forms a formant having a desired formant center frequency, and a synthesizing part that mixes a plurality of the formants formed by the plurality of the formant forming parts to generate a voice, wherein the method controls each of the plurality of the formant forming parts by the steps of:

specifying a desired waveform shape from among a plurality of waveform shapes;

storing waveform data corresponding to the plurality of the waveform shapes in a memory;

generating an address changing at a rate corresponding to the formant center frequency, and reading from the memory the waveform data corresponding to the specified waveform shape in response to the generated address; and

generating an envelope signal which rapidly decays every timing corresponding to a pitch period of the voice and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read from the memory.

Claim 21 (currently amended): A <u>computer-readable medium having a</u> computer program for use in a sound source apparatus having a voice synthesis capability and comprising a plurality of tone forming parts for outputting either of desired tones or formants according to designation of a wave table sound source mode or a voice synthesizing mode, such that the tone forming parts generate the tones in the wave table sound source mode, and generate the formants for synthesis of a voice in the voice synthesizing mode, the computer program being executable by the sound source apparatus for controlling each of the tone forming parts by the steps of:

specifying a desired waveform shape from among a plurality of waveform shapes;

storing waveform data corresponding to the plurality of the waveform shapes in a memory;

generating in the wave table sound source mode a variable address changing at a rate corresponding to a musical interval of the tone to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating in the voice synthesizing mode a variable address changing at a rate corresponding to a center frequency of the formant to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating in the wave table sound source mode an envelope signal which rises in synchronization with an instruction to start the generating of the tone and decays in synchronization with another instruction to stop the generating of the tone, and applying the generated envelope signal to the read waveform data; and

generating in the voice synthesizing mode an envelop signal which rapidly decays every timing corresponding to a pitch period of the voice to be synthesized and rapidly rises after the decay, and applying the generated envelope signal to the read waveform data.

Claim 22 (currently amended): A <u>computer-readable medium having a</u> computer program for use in a sound source apparatus having a voice synthesis capability and comprising a plurality of tone forming parts for outputting either of desired tones or formants according to designation of a wave table sound source mode or a voice synthesizing mode, such that the tone forming parts generate the tones in the wave table sound source mode, and generate the formants for synthesis of a voice in the voice synthesizing mode, the computer program being executable by the sound source apparatus for controlling each of the tone forming parts by the steps of:

specifying a desired waveform shape from among a plurality of waveform shapes;

storing waveform data corresponding to the plurality of the waveform shapes in a memory;

generating in the wave table sound source mode a variable address changing at a rate corresponding to a musical interval of the tone to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating in the voice synthesizing mode a variable address changing at a rate corresponding to a center frequency of the formant to be generated, and reading the waveform data corresponding to the specified waveform shape from the memory by the variable address;

generating an envelope signal which rises in synchronization with an instruction to start the generating of the tone or the synthesis of the voice and decays in synchronization with another instruction to stop the generating of the tone or the synthesis of the voice, and applying the generated envelope signal to the read waveform data; and

adding a noise in the voice synthesizing mode to the waveform data with the envelope signal applied.

Claim 23 (currently amended): A computer-readable medium having a computer program for use in a voice synthesizing apparatus comprising a plurality of formant forming parts, each of which forms a formant having a desired formant center frequency, and a synthesizing part that mixes a plurality of the formants formed by the plurality of the formant forming parts for generating a voice, the computer program being executable by the voice synthesizing apparatus for controlling each of the formant forming parts by the steps of:

storing waveform data corresponding to a predetermined waveform shape in a memory;

generating an address changing at a rate corresponding to the formant center frequency so as to read the waveform data stored in the memory by the generated address to thereby form the formant; and

adding a noise to the waveform data read from the memory.

Claim 24 (currently amended): A computer-readable medium having a computer program for use in a voice synthesizing apparatus comprising a plurality of formant forming parts for forming formants having desired formant center frequencies in the form of either voiced sound formants or unvoiced sound formants according to designation of a voiced sound synthesizing mode or an unvoiced sound synthesizing mode, and a synthesizing part that mixes a plurality of the voiced sound formants formed by the plurality of the formant forming parts to generate a voiced sound, and that mixes a plurality of the unvoiced sound formants formed by the plurality of the formant forming parts to generate an unvoiced sound, the computer program being executable by the voice synthesizing apparatus for controlling each of the formant forming parts by the ~~steps of;~~ steps of:

generating an address changing at a rate corresponding to the formant center frequency of the formant and reading the waveform data from the memory in response to the generated address;

generating in the voiced sound synthesizing mode an envelop signal which rapidly decays every timing corresponding to a pitch period of the voiced sound and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read from the memory; and

generating in the unvoiced sound synthesizing mode an envelope signal which rises in synchronization with an instruction to start the generating of the unvoiced sound and decays in synchronization with an instruction to stop the generating of the unvoiced sound, and applying the generated envelope signal to the waveform data read from the memory.

Claim 25 (currently amended): A <u>computer-readable</u> <u>medium having</u> a computer program for use in a voice synthesizing apparatus comprising a plurality of formant forming parts for forming formants having formant center frequencies in the form of either voiced sound formants or unvoiced sound formants according to designation of either a voiced sound synthesizing mode or an unvoiced sound synthesizing mode, and a synthesizing part that mixes a plurality of the voiced sound formants formed by the plurality of the formant forming parts to generate a voiced sound, and that mixes a plurality of the unvoiced sound formants formed by the plurality of the formant forming parts to generate an unvoiced sound, the computer program being executable by the voice synthesizing apparatus for controlling each of the formant forming parts by the ~~steps of:~~ <u>steps of:</u>

specifying a desired waveform shape from among the plurality of the waveform shapes in the voiced sound synthesizing mode;

specifying a predetermined waveform shape in the unvoiced sound synthesizing mode;

generating an address changing at a rate corresponding to the formant center frequency, and reading from the memory the waveform data corresponding to the specified waveform shape in response to the generated address;

generating in the voiced sound synthesizing mode an envelop signal which rapidly decays every timing corresponding to a pitch period of the voiced sound and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read from the memory; and

generating in the unvoiced sound synthesizing mode an envelope signal which rises in synchronization with an instruction to start the generating of the unvoiced sound and decays in synchronization with an instruction to stop the generating of the unvoiced sound, and applying the generated envelope signal to the waveform data read from the memory.

Claim 26 (currently amended): A computer-readable medium having a computer program for use in a voice synthesizing apparatus comprising a plurality of formant forming parts, each of which forms a formant having a desired formant center frequency, and a synthesizing part that mixes a plurality of the formants formed by the plurality of the formant forming parts to generate a voice, the computer program being executable by the voice synthesizing apparatus for controlling each of the formant forming parts by the steps of:

specifying a desired waveform shape from among a plurality of waveform shapes;

storing waveform data corresponding to the plurality of the waveform shapes in a memory;

generating an address changing at a rate corresponding to the formant center frequency, and reading from the memory the waveform data corresponding to the specified waveform shape in response to the generated address; and

generating an envelope signal which rapidly decays every timing corresponding to a pitch period of the voice and rapidly rises after the decay, and applying the generated envelope signal to the waveform data read from the memory.